X.

On the Genus Croomia, *and its Place in the Natural System.*

By ASA GRAY, M. D.

(*Read April* 12, 1859.)

CROOMIA, Torr. & Gray.

Perigonium alte 4-partitum, persistens; phyllis ovalibus cruciatim oppositis enerviis, æstivatione imbricatis (duobus interioribus), in anthesi patentissimis. Stamina 4, fundo perigonii inserta, phyllis anteposita: filamenta discreta, brevia, crassa, erecta: antheræ apici filamenti oblique introrsum inserta, immobiles, connectivo vix ullo, loculis appositis ovalibus fere bilocellatis longitudinaliter dehiscentibus. Pollen globosum. Ovarium simplex, ovato-globosum, liberum, arcte sessile, vel ima basi fundo perigonii leviter accretum, uniloculare, stigmate sessili integro depresso apiculatum. Ovula 4 – 6, anatropa, e summo loculo suspensa; funiculis brevibus criniferis. Folliculus ovatus, sæpe rostrato-acuminatus, subcoriaceus, demum bivalve; placenta nerviformi, e sutura ventrali secedente vel separabili, apice 1 – 3-sperma. Semina majuscula, obovata, appensa, rugoso-pluricostata, ad chalazam planam inappendiculata, superne fibris crinalibus copiosissimis longis e funiculo longiusculo rhapheque ortis quasi arillata. Testa coriacea. Embryo minimus, in albumine carnoso-corneo prope umbilicum inclusus, obovatus cum extremitate radiculari supera brevi angustata, monocotyledoneus. — Herba perennis, caule humili simplicissimo e rhizomate subterraneo repente longe enodi apice confertim sed alternatim vel subfasciculatim 4 – 6-phyllo; foliis longius petiolatis Dioscoreineis oblongo-cordatis 5 – 9-costatis cum venulis transversis reticulatis; pedunculis axillaribus paucifloris, pedicellis medio articulatis superne clavellato-incrassatis; floribus parvis, perigonio viridulo basi intus filamentisque purpureis, antheris lateritiis.

Corpus lignosum caulis inter medullam et corticem cellulosum circulatim dispositum, in caule proprio e fasciculis 7 – 10 parvis late discretis (raro binatis) uniseriatis, in rhizomate zonam integram, radiis medullaribus nullis percursam, efficiens.

Croomia pauciflora, *Torr. & Gray, Fl. N. Amer.* 1. *p.* 663; *Gray, Gen. Ill.* 1. *p.* 89, *t.* 37. Anonymos dioscoroides, *Croom in Sill. Jour.* 28, *p.* 165. Cissampelos pauciflora, *Nutt. in Jour. Acad. Philad.* 7, *p.* 115. Hab. in umbrosis Floridæ occidentalis et Alabamæ.

When this genus was characterized by Dr. Torrey and myself, almost twenty years ago, we were puzzled to decide whether the plant was monocotyledonous and endoge-

nous, or dicotyledonous and exogenous. As the structure of the embryo could not be made out, and the germination was unknown, we were obliged to depend mainly upon the structure of the stem. A portion of the creeping rhizoma, attached to the base of some of the original specimens, exhibited a closed zone of wood, surrounding a small cellular pith, and itself surrounded by a thick and purely parenchymatous cortical stratum. This we naturally took for an exogenous structure; — a view we were the more inclined to adopt, from knowing at the time no Smilaceous, Dioscoreaceous, or other allied Monocotyledonous plant having a simple ovary and an arillus like that which is so remarkable in *Croomia*. Among Dicotyledons the nearest approach to our plant in structure and in habit was found in some of the herbaceous *Berberidaceæ;* and we accordingly referred it to that order, notwithstanding the simple and persistent perigonium.

No additional materials were at hand when the first volume of the *Genera Illustrata* was prepared. So the genus was left appended to the *Berberidaceæ*, but mentioned as of wholly doubtful affinity.

Within the last two years I have been supplied, by Dr. Cabell and the Rev. Mr. Nevius of Alabama, with excellent dried specimens, including mature fruit and seeds. Mr. Nevius has also communicated living rootstocks, from which I have now the plant in blossom in the conservatory of the Cambridge Botanic Garden. I have therefore had the opportunity of a complete examination of *Croomia*, except as to the germination, in respect to which our attempts have thus far been unsuccessful.

From these observations an amended generic character is given above. One correction of considerable consequence is, that the stamens are not really hypogynous, but are inserted upon the base of the calyx, which, moreover, shows some tendency to be connate with the base of the ovary. In the nearly full-grown flower-bud, the cavity of the ovary at its broad base sinks slightly below the line of junction with the perianth (as in Fig. 3); in anthesis it deepens somewhat, so as to give a slight appearance of adnation, as is represented in Fig. 4. As the fruit forms, however, this incipient adnation disappears. The mature fruit is usually somewhat contracted or tapering at the base, and above dilated where the large seeds are contained; but the cell extends down to the very insertion of the perianth and stamens, so that there is no trace of any intervening hypogynous receptacle, as in *Thalamifloræ*.

The singular arillus, if it may be so denominated, belongs wholly to the funiculus, in the first instance. In the young flower-bud it consists of short-cylindrical simple cells, like forming root-hairs, growing from its whole surface. As these lengthen, they are converted, by the formation of transverse partitions, into a simple series of

cylindrical cells, as shown in Fig. 6. Long before the seed matures, each of these hairs or rows of uniserial cells becomes a much thicker and longer thread or band, more or less club-shaped towards the extremity, and composed of a tissue of cells (Fig. 12). Some of these threads are now found to originate from the rhaphe, but far the greater part of them belong to the funiculus.

Upon a re-examination of the minute embryo, taken from well-matured seeds, the obscure nick which had before been discerned at its larger or cotyledonar extremity, was found to be eccentric. The figures 13 and 14 exhibit the embryo under the microscope, as it appeared to Mr. H. J. Clark, who kindly furnished these figures. As the views obtained by Mr. Sprague and myself, although not so clear, were not essentially different, we conclude that the embryo is monocotyledonous.

The structure of the stem is more ambiguous. The woody bundles which compose the whole fibro-vascular tissue of the proper stem above ground, from seven to ten in number, as seen in a transverse section, stand strictly in a circle, thus dividing the general parenchyma into a central medullary and an external cortical portion, just as in the seedling or nascent stem of an herbaceous Exogen. Indeed, the whole appearance is far more like the exogenous type than is that of the stalk of *Podophyllum*, in which the somewhat similar bundles are irregularly dispersed.

In *Croomia*, however, the anatomical structure of the individual bundles does not accord with that of ordinary exogenous bundles. These remain as definite threads, cylindrical or nearly so, and separated by uncompressed parenchyma, although two adjacent bundles are occasionally confluent into a broader double one; and there is no appearance of a cambial stratum dividing each bundle into an outer and an inner portion, answering to liber and to wood. But — so far as revealed by a rather superficial examination, under moderate powers of the microscope — each separate bundle consists of nascent or cambium cells in the centre, surrounded by a zone of thick-walled elongated cells, the inner ones apparently bast-cells, and the outer common prosenchyma; this in turn surrounded by a complete, or nearly complete, zone of ducts, commonly uniserial and the greater part scalariform; and this by a more or less definite and thin layer of prosenchyma or wood-cells. These woody bundles, therefore, — although peculiar, and worthy of detailed examination by a phytotomist, — appear to be endogenous, or at least not exogenous, in type.

In the rhizoma, the more abundant fibro-vascular tissues form a complete and closed, although somewhat irregular, zone of wood, surrounding a small but well-defined pith, and itself surrounded by a broad parenchymatous cortical portion (the parenchyma of both loaded with starch); thus closely imitating the exogenous structure. But there

are no medullary rays, and no trace of cambium-layer and liber. Not being prepared to illustrate its anatomy at present, it may suffice to say that the woody layer of the rhizoma appears as if composed of a series of such bundles as those in the leafy stem, but completely and very irregularly confluent into a closed zone.

The only endogenous stems I know of which exhibit a distinct pith are those of *Dioscorea*. The rhizoma of *Croomia* in structure is not materially unlike the herbaceous leafy stems of *Dioscorea villosa*, and the foliage and habit of *Croomia* are altogether Dioscoreaceous.

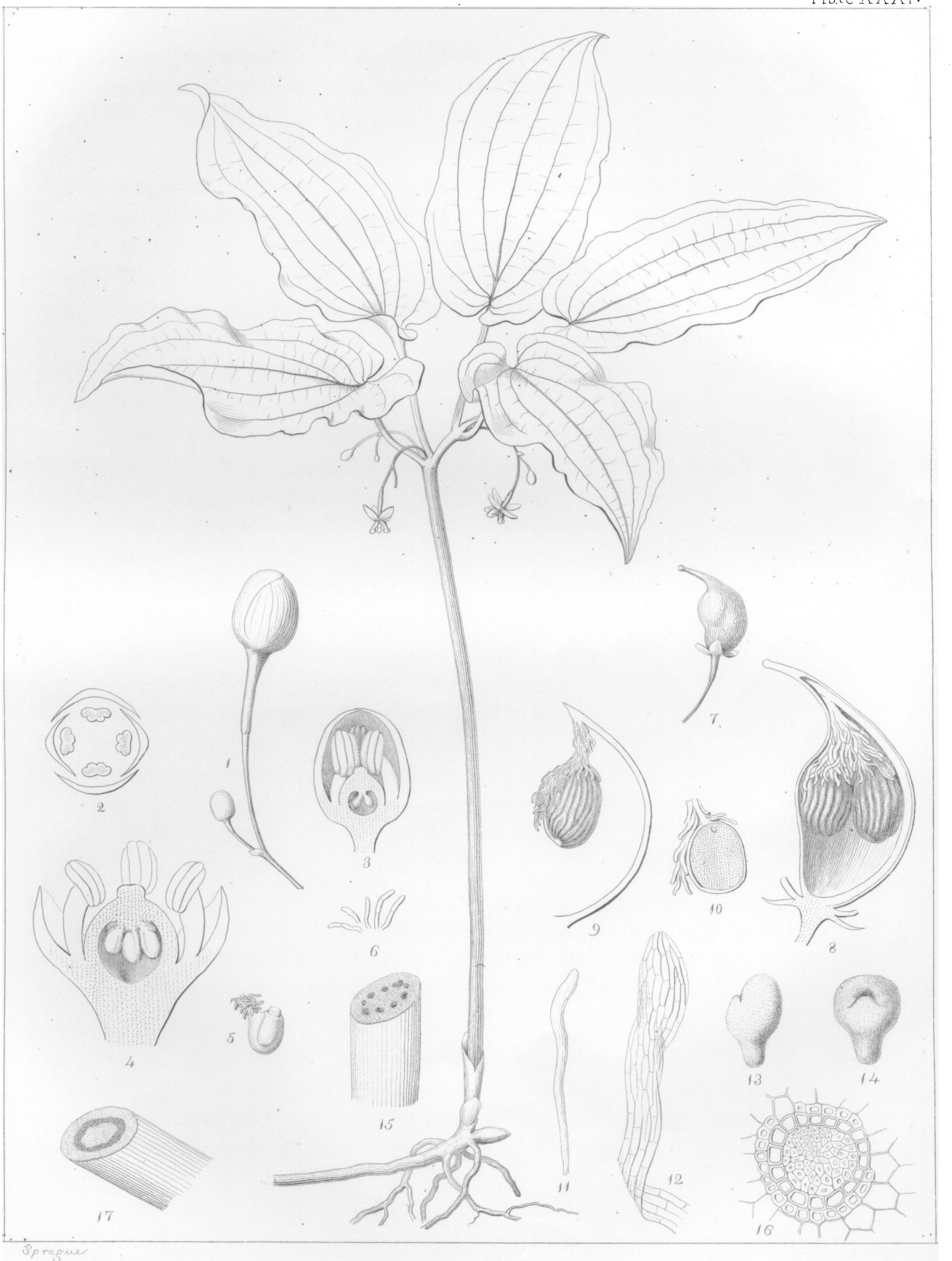
It is needless to enumerate the obvious points of difference between *Croomia* and the *Dioscoreaceæ*, now that I can point to a different but allied group, hitherto monotypic and altogether peculiar, to which our present genus may doubtless be directly referred; namely, the *Roxburghiaceæ*, proposed as a natural order to contain the small Eastern-Asian genus *Roxburghia* alone. As now augmented by another genus, it may prefer a better claim to ordinal rank.

I possess no specimens of *Roxburghia;* but a comparison with the published characters, and with Wallich's figures of the fruit and seed of *R. viridiflora*, leave no doubt that *Croomia* and *Roxburghia* are members of the same and a peculiar natural group. The principal differences are in the configuration of the stamens, in the attachment of the seeds, &c., and are merely generic. The two genera may be contrasted in their essential characters as follows: —

1. Roxburghia. Sepala plurinervia, acuta vel acuminata. Filamenta basi monadelpha: antheræ facie interiore connectivi maximi apice subulato-producti adnatæ, loculis angustis ex apice vacuo subulatis vel mucronatis. Semina ad chalazam rostellata, ex *Endl.* "in placentis parietalibus ad basin valvularum plurima e funiculis elongatis, apice in arillum stuposum solutis erecta." Embryo "albumine quadruplo brevior" (ex *Kunth*), subclavatus, "extremitate radiculari incrassata." (*Endl.*) — Suffrutices volubiles, Orientali-Asiatici, foliis plerisque oppositis seu verticillatis, floribus sat magnis.

2. Croomia. Sepala ovalia, obtusa, fere enervia. Stamina discreta: antheræ breves, filamento oblique introrsum impositæ, connectivo nullo. Semina pauca, per funiculos breviusculos copiose crinigeros apici placentæ filiformis intervalvularis inserta, suspensa. Embryo minutus, obovatus, extremitate cotyledonea incrassata. — Herba humilis Americæ Boreali-orientalis, caule erecto apice folioso, floribus parvis.

Plate XXXI. Flowering plant of *Croomia pauciflora*, of the natural size. Fig. 1. Peduncle and flower-buds. 2. Diagram of the flower in transverse section. 3. Vertical section of a flower-bud. 4. Vertical



CROOMIA PAUCIFLORA

section of an expanded flower. 5. An ovule. 6. Hair-like processes of the funiculus, which compose the arillus? 7. A fruit, of the natural size. 8. Vertical section of a fruit, showing the seeds, &c. 9. The filiform sutural placenta detached, with one of the seeds hanging from its summit. 10. Vertical section of a seed. 11. One of the threads of the arillus. 12. Its extremity, much more magnified. 13, 14. The embryo detached, in two different positions. 15. Section of the stalk or stem above ground. 16. Transverse section of one of the woody bundles of the stalk, much magnified. 17. Section of the subterranean rhizoma. — All the analyses, except Fig. 7, more or less magnified.

XI.

Characters of ANCISTROPHORA, *a New Genus of the Order Compositæ, recently detected by* CHARLES WRIGHT, ESQ. *in the Eastern Part of Cuba.*

BY ASA GRAY, M. D.

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ANCISTROPHORA, Nov. Gen.

Capitulum multiflorum, heterogamum; floribus homochromis, radii 8 – 10 ligulatis fœmineis, disci tubulosis hermaphroditis. Involucrum disci brevius; squamis æqualibus bi–triseriatis, exterioribus herbaceis oblongis obtusis, intimis angustioribus receptaculi paleas referentibus. Receptaculum convexum, paleatum; paleis linearibus fere membranaceis planis persistentibus achenia æquantibus. Ligulæ oblongæ, tubulo brevissimo. Corollæ disci e tubo brevi campanulato-ampliatæ, 4-dentatæ. Antheræ breves, ecaudatæ. Styli rami fl. herm. subplani, appendice triangulari acuta hispidula superati. Achenia conformia, late obovata, compresso-plana, margine calloso crasso (nunc subalato) cincta, apice hinc uniaristata; arista achenio longiore persistente lævi apice arcte uncata. — Herba pusilla, acaulis, hirtella, *Bellidis* seu *Lagenophoræ* facie, sed floribus aureis. (Nomen ex ἄγκιστρον, *hamus*, et φέρω, *fero*, ob achenium hamigerum, dicatum.)

ANCISTROPHORA WRIGHTII. In montosis Cubæ orientali, prope "*Monte Verde*," saxatilis. — Radix annua? Folia rosulata, obovata, subintegerrima, pilis articulatis conspersa, membranacea. Scapi plurimi, bi–tripollicares, nudi, monocephali. Capitulum sesquilineam latum. Ligulæ breviter exsertæ. Squamæ et paleæ demum, fructu delapso, reflexæ. Achenia vix $\frac{3}{4}$ lin. longa, parce hispidula, facie utraque leviter unicostata, margine calloso-incrassato, ad apicem latere interiore aristam arcte hamatam corolla disci subæquilongam, exteriore aristellam brevissimam sæpius evanidam, gerentia.